Saskatchewan Ministry of Agriculture

CROP PRODUCTION NEWS

Volume 32, No. 5 **July 9, 2010**

CROP PRODUCTION

PRODUCTION

Editor's Comments

By Sean Miller, PAg, Crops Branch

The much needed sunshine and heat over the last number of days were welcomed in many areas of the province to get crops moving forward.

Crop diseases and insect pests require our focus throughout July. For information on crop protection products, check out the *2010 Guide to Crop Protection* at www.agriculture.gov.sk.ca/Guide_to_Crop_Protection.

If you discover a pest that you cannot identify, you can submit a sample to the Crop Production Laboratory. For information on how to submit a sample to the lab, go to Saskatchewan Agriculture's website at: www.agriculture.gov.sk.ca/programs-services and scroll down to Crop Protection Laboratory Services.

The Bertha Armyworm Monitoring Program is underway and counts are coming in. The first map of the season will soon be available. If you are a Bertha armyworm trap co-operator, please remember to forward your land locations and weekly counts to Sean Miller at 1-888-323-7842 or fax at 306-787-0428.

To check the progress of Saskatchewan's crops throughout the growing season, see the Saskatchewan Ministry of Agriculture *Weekly Crop Report* at: www.agriculture.gov.sk.ca/Crop-Report.

There are various Agri-ARM field days planned throughout July. Plan to attend the one nearest you, and learn about the latest in production and development research. Refer to the May 27 issue of the Crop Production News for dates and locations.

NOTE: Throughout this document, you will see that some publications are in blue font and underlined, indicating links to website information. If you are reading this on your computer screen, click your cursor on the link to take you directly to the website. ✪

Crop Production News is a bi-weekly publication prepared primarily by provincial specialists with the Crops Branch and Regional Services Branch of the Saskatchewan Ministry of Agriculture. It is a compilation of articles related to entomology, plant pathology, weed science, soils and agronomy issues.

If you wish to be added to or removed from our mailing list, forward your request by e-mail to: sean.miller@gov.sk.ca

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Crop Protection Laboratory Update

By Philip Northover, AAg, Supervisor, Crop Protection Laboratory

Since the last report, the majority of samples submitted to the Crop Protection Lab have been related to excess moisture concerns, chiefly in cereals and lentils.

There has been a marked increase in lentil, pea and wheat submissions over the past two weeks. Many exhibit yellowing consistent with excess moisture and a few cases of root rot have been identified.

Over the past two weeks, lab technicians have diagnosed:

- Wheat: tan spot; spot blotch, chemical injury, wheat streak mosaic virus and excess moisture;
- Lentils: anthracnose, ascochyta and excess moisture;
- Canola: blackleg, Group 2 herbicide injury and damping off;
- Alfalfa: anthracnose;
- Peas: fusarium root rot;
- Tomato: botrytis stem canker;
- Pepper: sclerotinia stem rot and botrytis stem canker;
- Caragana: septoria leaf spot; and
- Honeysuckle: botrytis leaf blight.

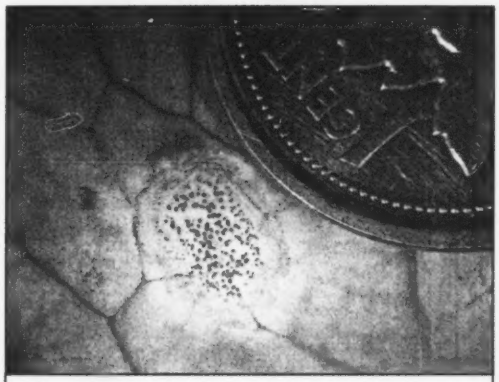


Figure 1: Blackleg lesion on canola.
Source: Saskatchewan Agriculture.

Ten potential Dutch elm disease submissions have been received this year; all tested negative for Dutch elm disease. There have been no positive submissions to date. ☼

For information about submitting samples to Saskatchewan Agriculture's Crop Protection Lab, go to www.agriculture.gov.sk.ca (Programs and Services > Crop Protection Lab Services); or www.agriculture.gov.sk.ca/web_videos
Or phone (306) 787-8130.

Agriculture Knowledge Centre Update

By Brent Flaten, PAg, Integrated Pest Management Specialist

The largest number of calls during the past week has been on fungicide applications for crop diseases. Leaf diseases are prominent across the province including the southwest. Producers have been asking about timing and economical thresholds for applying fungicides. Deciding whether or not to spray lentils prior to canopy closure has been a hot topic, including applications for white mould or just anthracnose and ascochyta. Producers are also trying to distinguish between leaf diseases and stress related symptoms on various crops including cereals, pulses and oilseeds. Root rot is also quite prevalent this year, especially with tighter crop rotations. In some severe cases of root rot, large portions of fields have died with the recent hot weather.

Other topics include: grasshoppers starting to show up in the south creating some concern to lentil growers, diamondback moth larvae are feeding in canola and some weed control issues.

On the soils side of things, topdressing questions are slowing down as crops are maturing beyond the stage when it is still beneficial.

There are continuing concerns that the rain, standing water and high humidity is slowing the cutting and baling of great looking hay stands and potential reduction of hay quality as a result. Related to this topic are inquiries on hay preservative effectiveness and economics. Another common question is "When is it too late to seed greenfeed for swath grazing?" ☼

Reducing Drying Time of Cut Hay

By Michel Tremblay, PAg, Provincial Specialist, Forage Crops

The goal of conscientious hay growers is to minimize dry matter losses as the crop is cut, cured, baled, transported and fed. Large dry matter losses can occur when the crop is cut and field-cured to a moisture content that allows for storage with minimal risk of spoilage. Curing hay in the field exposes it to dry matter losses due to post-cut plant respiration, microbial degradation, as well as bleaching and leaching due to the sun and rain. Extended drying times increase losses due to respiration within the plant, which is greatest immediately after cutting, when the moisture content is high or when microbial activity and oxidation of vitamins and minerals occurs. When drying a hay crop, the primary goal is to reduce the amount of time required to field-cure the hay to the desired moisture content. Some factors to consider when reducing drying times include:

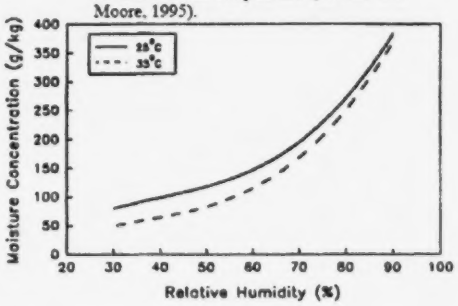
Temperature

Higher air temperatures will result in faster drying, but relative humidity will have a significant impact on drying rates at a given temperature.

Relative Humidity

Drying rate is inversely proportional to relative humidity (Figure 2). Drying rates and equilibrium moisture levels at a given temperature will vary according to the relative humidity percentage.

Figure 2. Equilibrium moisture content of hay is proportional to the relative humidity in the air and the air temperature (Collins and Moore, 1995).



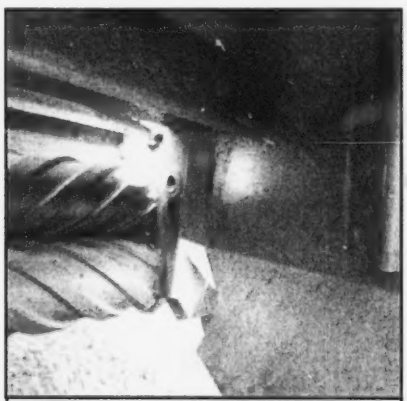


Figure 3: Correct spacing and tension on the conditioning rollers (left), and adjustment of the crop deflector (above) and windrow forming shields (right) result in quick drying with minimal crop damage.
Source: Saskatchewan Agriculture

Timing of Cutting

Crop development can have a significant impact on how quickly hay will dry down. As the hay crop matures, the moisture content of the crop declines. Pre-boot grass has a moisture content of 80 to 90 per cent. Boot stage grass has a moisture content of 70 to 80 per cent. Flowering grass has a moisture content of 50 to 70 per cent and grass in the seed-set stage of development can have 50 per cent or less moisture. Cutting at a later stage of development, in order to reduce field-curing time, has to be balanced with the fact that forage quality declines as the plant matures.

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Reducing Drying Time of Cut Hay
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Conditioning
Successful conditioning occurs when 90 per cent of the stem is cracked or exhibits a reduction in rigidity, with less than five per cent of the leaves exhibiting signs of bruising or blackening. The conditioning roller gap (Figure 3) and roller pressure should be set to achieve these results. Conditioning action should be checked in each field, as crop kind, windrow size, stem diameter, maturity level and moisture content of the crop will impact conditioning action. Windrows should be made as wide as possible to speed drying.

Packaging
Bale type will dictate safe moisture levels for storage. Generally, small, medium and large square bales will safely store at 15 per cent moisture. Hard-core round bales will safely store at 18 per cent and soft-core round bales will store at 20 per cent moisture.

Additives
Hay preservatives can be applied to hay at baling to reduce microbial activity, thereby reducing dry matter losses. Acid-based additives reduce microbial activity by reducing the pH of the hay. Biological additives contain cultures of organisms that inhibit harmful fungal growth. The cost of additives must be considered when determining the value of quality hay.

Taking the above factors into consideration will allow the producer to minimize field-drying time and dry matter losses and maximize feed quality and yield. ☼

Scout for Canola Diseases

By Faye Dokken-Bouchard, PAg, Provincial Specialist, Plant Disease

Canola under stress and diseases favoured by moist conditions should be on our radar this summer as we scout crops and make fungicide application decisions. Particular attention should be paid to crops under short rotations or with a past incidence of disease. It is also important to monitor crops for diseases in case you need to adjust your management strategies in the future, as there will likely be an increased level of inoculum relating to any of the diseases we observe this season. Regularly check at least five sites in a field of less than 100 acres and at least 10 sites for more than 100 acres. Walk a zigzag pattern throughout the crop to cover a large area. Below are a few of the diseases to watch out for this season.

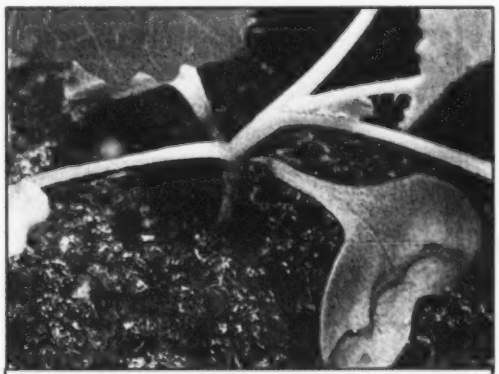

Figure 4: Rhizoctonia wire stem on canola. Source: Saskatchewan Agriculture.

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Scout for Canola Diseases

(Continued from page 5)

Seedling Diseases

Saturated soil, cool conditions and lack of sunshine led to yellowing of many crops this spring. Seed rots, root rots, damping-off (sudden death either pre- or post-emergence), wire stem (constriction of the stem base) and seedling blights (yellowing, severe withering) may have also been apparent this spring, particularly in stressed canola crops. While different combinations of soil-borne pathogens can cause various problems, *Rhizoctonia solani* is most often the cause of seedling blight and wire stem (see Figure 4), while *Pythium* and *Fusarium* often cause damping-off and root rot when conditions favour slower growth. Different strains of these pathogens can also cause brown girdling root rot and foot rot later on.

While nothing can be done to treat seedling diseases this year, warm, dry conditions should help improve the health of these crops. In the future, always use seed with good germination and sow into a firm seedbed in contact with moisture at optimum seeding depth, avoiding contact with infested residue. Ensure rapid stand establishment by following good agronomic practices, including a four-year crop rotation for canola.

Blackleg

According to the Saskatchewan Canola Disease Survey, blackleg has been very low in recent years, with an incidence of only 1.5 per cent in 2009 compared to 11 per cent in 1999. Environmental stress and hail damage in canola growing areas may result in a slight increase of blackleg this year. In fact, the disease has already been reported in several areas of the province, with lesions appearing on canola leaves. Physical damage can predispose even resistant varieties of canola to blackleg.

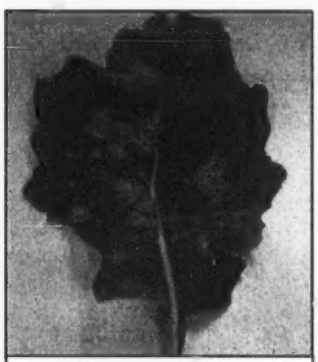

Figure 5: Blackleg lesions
Source: Dr. Randy Kutcher.

Lesions will be greyish white, speckled with black pycnidia. Severely infected plants may develop dry sunken cankers at the stem base (see Figure 5).

Most canola varieties are resistant to blackleg, but this disease is genetically diverse and can quickly overcome resistance, therefore crop rotation is important. Fungicides containing propiconazole (i.e. Tilt, Bumper, Pivot) are registered for foliar application. Fungicide timing for blackleg is earlier than for sclerotinia, with applications recommended at the two-to-six leaf stage, prior to bolting.

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Scout for Canola Diseases

(Continued from page 6)

Alternaria Leaf and Pod Spot

Certain species of *Alternaria* commonly cause grey to black spots on canola leaves, stems and pods. Depending on the conditions, disease severity may range from trace lesions to severe pod infections, resulting in direct yield loss, seed shrinkage, premature ripening, pod splitting and infection of developing seeds. Sporulation and infection are favoured by warm, humid conditions, as well as moisture in the form of rain or dew.

Foliar fungicides may be used to control or suppress the disease when applied from the late-flowering to early pod stages. Lance, Quadris and Rovral Flo/RX fungicides are registered for control of *Alternaria* in canola. Crops should be swathed when there is an average of 60 per cent seed colour change on the main stem and combined as soon as they are ripe to reduce saprophytic growth of *Alternaria* in the swath.

Sclerotinia

Precipitation or a thick crop canopy provides ideal humid conditions for development of sclerotinia. Infected plant parts become bleached, brittle and hollow, often containing hard black sclerotia (resting bodies). Premature ripening of infected canola results in erect, straw-coloured plants adjacent to healthy green plants, which may lodge under the weight of filling pods.

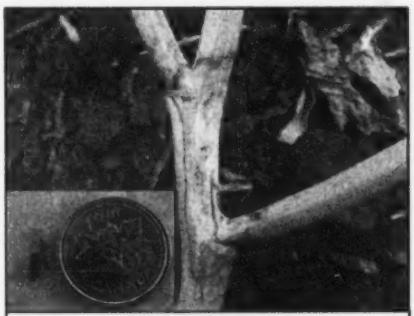

Figure 6: Sclerotinia on canola. (insert sclerotium with apothecium)
Source: Saskatchewan Agriculture.

Scout for sclerotia in the soil and note favourable moisture (wet or humid weather, soil at or near field capacity) and temperature (15-20 C) conditions from mid-June to September when apothecia are being produced. Fungicide applications should coincide with 20 to 30 per cent bloom stage in order to protect as many canola petals as possible before they begin to drop. It is too late to control by the time you see symptoms. The following fungicides are registered for control of sclerotinia in canola: Lance, Proline, Quadris, Rovral Flo/RX, and Serenade Max/ASO.

Clubroot

Symptoms have not been observed in Saskatchewan. However, the clubroot pathogen was detected in a soil survey for the disease in 2008. Clubroot spreads by resting spores in the soil or in canola plant material containing galls. Resting spores can survive in soil for up to 20 years. The disease is favoured by short crop rotations and moist soils.

Greater risk of spreading this disease from field to field lies with soil transportation by field equipment. In Alberta, their *Agricultural Pest Act* gives municipalities the power to enforce crop rotations during which canola cannot be grown in fields infected with clubroot. Clubroot has been declared a pest in Saskatchewan under *The Pest Control Act*, which would give municipalities similar powers.

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Scout for Canola Diseases

(Continued from page 7)

Saskatchewan canola growers should be attentive this fall while crop scouting and harvesting. Watch out for poorly performing patches in your canola fields. If there are patches of yellowing, wilting and stunting, or premature ripening and poor performance, pull up a few plants in that area to check the roots for galls. Clubroot symptoms are not visible on above-ground plant parts. Diagnosis can only be done by pulling plants from the ground and visually inspecting roots.

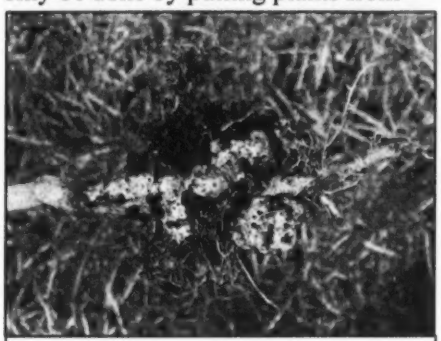

Figure 7: Clubroot gall on canola.
Source: Saskatchewan Agriculture.

If you are not sure, collect canola root samples with below ground parts intact and contact the Crop Protection Laboratory in Regina for visual diagnosis or a qualified seed testing laboratory for DNA testing.

At this time, the only measures to control this disease are early detection, prevention of spread and rotation.

Canola Disease Survey

The 2010 Canola Disease Survey will soon be underway. Survey participants will be assessing the health of a representative sampling of canola fields across the province. Incidence of all diseases will be recorded for at least 200 fields and soil samples from 75 fields will be collected for clubroot testing in 2010. This information will be published in the Canadian Plant Disease Survey. ✿

Pulse Disease Update

By Faye Dokken-Bouchard, PAg, Provincial Specialist, Plant Disease

Downy Mildew Reported in Peas

Figure 8: Downy mildew on field pea – systemic infection may lead to stunting, foliar discolouration, and further spread of the grayish-white growth.
Source: Saskatchewan Agriculture.

Downy mildew (*Peronospora viciae*) has already been reported on pea crops this year. Because of the pathogen's preference for cool, moist conditions, this disease has rarely been a significant problem on the Prairies. However, the disease was present in 30 per cent of pea crops surveyed in Saskatchewan in 2009 and with all the moisture received in 2010, we may see an increase in the incidence and severity of this disease this year as well.

Systemic infection causes stunting and foliar discolouration, in addition to mouldy growth (Figure 8). Watch out for growth of fluffy grey mould on the lower surface of leaves, corresponding to chlorosis, (yellowing) on the upper surface (Figure 9).

Spores can persist in the soil for over 10 years, and pea crops planted on previously infected fields will be subject to this disease if wet conditions occur. There are no registered fungicides for the control of downy mildew on pea, but research is underway to screen for possible solutions.

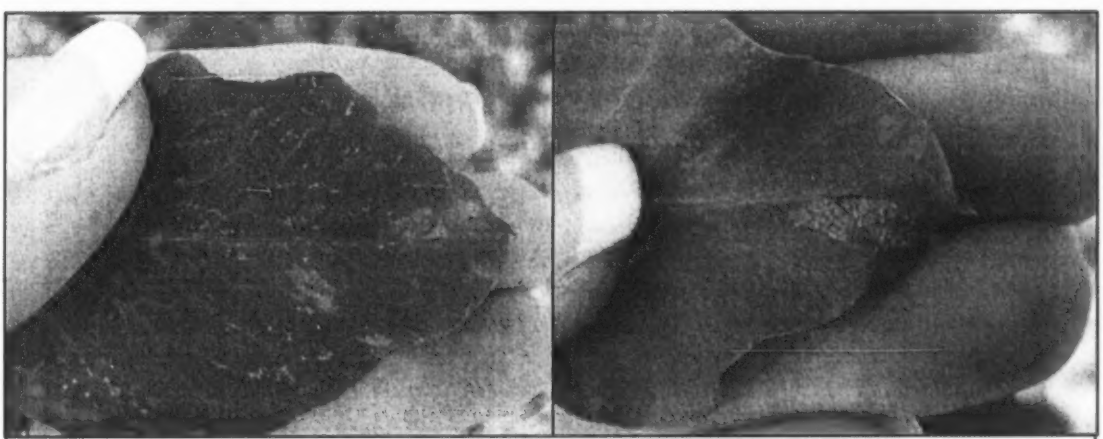

Figure 9: Downy mildew on field pea – chlorotic zones on upper surface of leaf, opposite to fluffy grayish-white growth on underside of leaf.
Source: Saskatchewan Agriculture.

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Pulse Disease Update
(Continued from page 9)

Lentil Disease Scouting

Disease scouting in lentils may begin at the seedling stage and continue regularly throughout the summer. Scout every seven days depending on disease risk. If time does not allow scouting of every field, focus on higher risk areas including: fields planted with infected seed; fields that had the same pulse crop within the previous two years; field margins adjacent to last year's infected pulse residue; areas where the plants have been stressed or have a dense plant canopy; and fields planted to disease-susceptible cultivars.

Observe lower leaves and stems closely for early symptoms. Bring a magnifying glass to identify inconspicuous signs and symptoms of diseases. Signs of disease include structures or products associated with the pathogen (e.g. mould, pycnidia, sclerotia). Symptoms are the detectable external and/or internal changes in the plant, as a result of infection (e.g. lesions, discolouration). If unsure, take a photo, consult an agronomist or send a sample to a diagnostic facility such as the Saskatchewan Agriculture Crop Protection Laboratory in Regina.

Figure 10: Ascochyta blight. Source: Saskatchewan Agriculture.

Seedling Disease Complex (*Botrytis, Sclerotinia, Fusarium, Pythium, Rhizoctonia*): Soil-borne pathogens can cause seed rot, root rot, damping-off (sudden death either pre- or post-emergence) and seedling blight (yellowing, severe withering).

Ascochyta Blight (*Ascochyta lentis*): Lesions begin as tiny brown spots and expand into tan-coloured, dark-bordered lesions containing small, round fungal fruiting structures called pycnidia (Figure 10).

Figure 11: Anthracnose. Source: Saskatchewan Agriculture.

Anthracnose (*Colletotrichum truncatum*): Symptoms are similar to ascochyta, but lesions are usually found on stems, do not develop pycnidia and have rather irregularly shaped black fungal structures (microsclerotia) or acervuli (Figure 11).

Sclerotinia Stem and Pod Rot (*Sclerotinia sclerotiorum*): Similar to other crops affected by sclerotinia, infected lentils wilt and tissues become bleached and covered with a white mould with formation of black sclerotia.

Figure 12: Stemphylium blight. Source: Saskatchewan Agriculture.

Stemphylium Blight (*Stemphylium botryosum*): Symptoms appear initially as small, light beige lesions on leaves/leaflets. Smaller lesions coalesce to produce large, irregularly shaped lesions that kill entire branches (Figure 12).

Botrytis Stem and Pod Rot (*Botrytis cinerea*): In humid conditions, infected plants are covered with grey fuzz (spores). ✿

Nodule Assessment

By Dale Risula, PAg, Provincial Specialist, Special Crops

Saskatchewan producers grow pulse crops partly because of their ability to fix atmospheric nitrogen in the soil. The process is possible through a symbiotic relationship between legume plants and a micro-organism called *Rhizobium*.

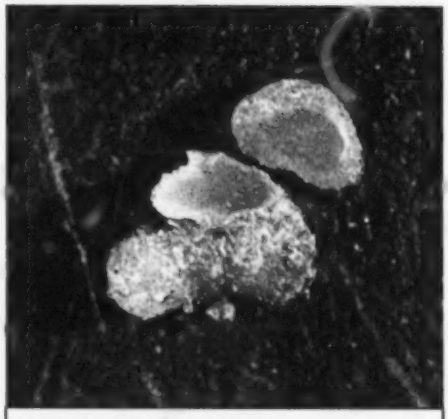

Figure 13: Healthy nodule.
Source: Saskatchewan Agriculture.

This relationship is formed in the roots when legume plants are inoculated with *Rhizobium* bacteria. The *Rhizobium* infects the roots and nodules are formed. These nodules are factories for the nitrogen fixation that subsequently takes place.

Nodules normally form about 14 days after plant emergence. However, in poor environmental conditions formation may take up to 28 days. The ability to fix atmospheric nitrogen, for use by the plant and for the provision of residual nitrogen, depends on how well these nodules are established.

To assess the establishment of nodules there are three areas of importance that should be examined. They include:

1) Healthy vigorous plants;
2) Nodule colour and number; and,
3) The distribution of the nodules on the root.

By examining these three factors you can determine how well the crop will be able to fix nitrogen.

The plants should have a nice green colour and they should be growing vigorously. The more pale and stunted they are, the more likely it is that there is a problem with the nitrogen fixing capability.

Secondly, the nodules on the roots should be formed in clusters and the more the better. Usually five or more nodules with distinct pink internal colour represent excellent nodule formation. If there are fewer than three nodules per cluster with poor internal colour, less nitrogen fixation will take place.

The third characteristic for effective nodulation is indicated by where the nodules are formed on the root. If the nodules are primarily formed around the crown it means the infection took place resulting from proper inoculation of the seed. If nodules are formed on the lateral roots, it is because of infection taking place from existing *Rhizobium* in the soil. These may be wild strains or bacteria from previous pulse crop inoculations. Crown nodulation is better than lateral nodulation, but having both is most beneficial.

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Nodule Assessment
(Continued from page 11)

Examining your plants for these three characteristics will help you determine whether your crop has effective nodulation or not. The best time to examine your crop is at early flowering. Generally, nitrogen fixation approaches its high point between early flowering and mid-flowering and then begins to decline. Once flowering is ended, nitrogen fixation shuts down.

Another factor that may affect nodulation is herbicide application. This may adversely affect the plant and slow the nodulation process. Wait a few days after spraying before assessing the nodulation of your crop.

Also, be sure to ***dig*** up the roots carefully without stripping the nodules off the roots as you would by simply *pulling* the plant out. Nodules are easily stripped off the roots if handled inappropriately.

For more details about pulse crop inoculation, please see the Saskatchewan Agriculture factsheet, www.agriculture.gov.sk.ca/Inoculation_Pulse_Crops. ☼

Herbicide Injury Symptoms – What to look for

Clark Brenzil, PAg, Provincial Specialist Weed Control

Herbicide injury season is here. Crops are lush with moisture and in various stages of development. In-crop weed control activities are beginning to slow. Most selective herbicides rely on plant metabolism to degrade the herbicide rapidly as it enters the crop plant to avoid its negative effects. When crops are temporarily stressed from environmental conditions, such as excessive cold or heat and excessive wet or dry, they can be impacted by the effects of the herbicide.

This year, in addition to determining herbicide symptoms, we have the added complication of high moisture stress symptoms that can be mistaken for herbicide injury. In this article, several herbicide injury symptoms will be described. These symptoms are generally considered sub-lethal.

See pages 34 and 35 of *The 2010 Guide to Crop Protection* for a list of herbicides that fit into each Herbicide Group. Check with the Spring Update for new products and additional generic products.

Group 1
Group 1 herbicides for use in broadleaf crops have a high level of tolerance. Injury to broadleaf crops is rarely seen. The most common injury during lush conditions is ***adjuvant burn*** to leaves with thin cuticles. **(Continued on page 13)**

Herbicide Injury Symptoms – What to look for
(Continued from page 12)

This can also happen with any other herbicide that uses oil or solvent based adjuvants that dissolve the wax on the surface of the leaf and expose that localized spot to desiccation. On occasion, broadleaf crops may also experience slight ***paling, yellowing or bleaching*** of leaves present at application.

Group 1 herbicides for use in cereal crops rely on plant metabolism as described above. When injured it is very common to see ***banding*** on cereal leaves that correspond to the time when the crop was stressed. The band can be white (seen particularly with tralkoxydim) to yellow and, depending on conditions, can be defined by a very sharp or gradual start and ending boundary. Once environmental conditions have improved, the plant rids itself of the herbicide and continues growing normally. Occasionally, stunting of new growth will occur.

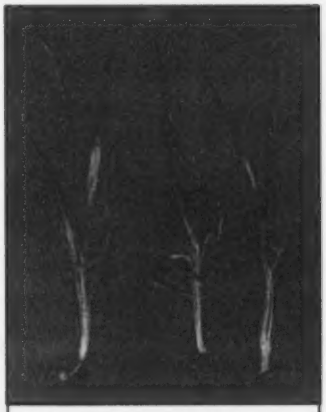

Figure 14: Banding from Group 1 injury in cereals. Source: Saskatchewan Agriculture.

Groups 2 and 9

Group 2 herbicides and Group 9 (glyphosate) herbicides generally exhibit very similar sub-lethal symptoms. Both are translocated to energy sinks or newly developing tissues systemically in the plant. Here, they interrupt metabolic pathways that produce building blocks for plant growth. As new tissues grow, they require the building blocks that the herbicides have eliminated, therefore they are affected first, turning growing points and young expanding leaves yellow. As time passes, additional symptoms appear, new internodes are shorter than normal and the apical dominance of the plant is lost. This results in lateral buds erupting along the stem instead of in an ordered pattern.

Figure 15: Compression of top of plants and erupting lateral buds from late exposure to Group 2 herbicide. Source: Saskatchewan Agriculture.

Cereal plants exposed in early development will produce two normal leaves and then begin to produce paler and progressively shorter leaves as the essential building blocks run short, giving the plant somewhat of a "V" shape rather than the normal pyramidal shape. Awn kinking can also occur.

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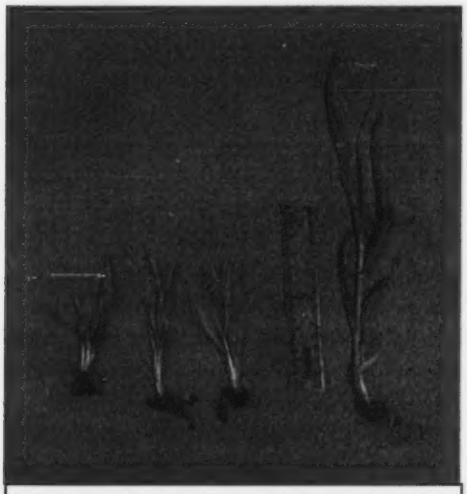

Figure 16: Severe stunting, compression of new growth resulting in a "V" shape and profuse tillering of Group 2 impacted cereals compared to unaffected (R).
Source: Saskatchewan Agriculture.

Group 3

Group 3 herbicides directly impact only root development. Other symptoms are secondary impacts due to loss of viable roots. Group 3 products prevent the normal elongation of roots and root hairs. This results in roots that are short, stubby and ending in a tough blunt point. If conditions are lush, affected plants may not exhibit any problems. When water and nutrients run low, the affected plants are not able to extend their roots and exhibit deficiency symptoms. Both grasses and broadleaf plants can be affected.

Figure 17: Stubby roots on cereals (R) as a result of exposure to Group 3.
Source: Rick Holm - University of Saskatchewan.

Group 4

Group 4 herbicides are hormone mimics that cause plants to grow uncontrollably and fail to produce specialized tissues. Broadleaf plants are most sensitive to these herbicides, but cereal crops can also show sub-lethal symptoms.

The most obvious symptoms in broadleaf plants are the twisting of stems, cupping and deformation of leaves, as the normal hormones that regulate these are overwhelmed. Uncontrolled growth of cells also occurs in the lower stem and upper root area. This is where Group 4 herbicides have their lethal effect on broadleaf weeds. Expanding callus tissue crushes the water transport vessels (xylem) of the plant resulting in top-growth desiccation. Because of structural differences in grass plants such as cereals, they are able to tolerate this crushing better than broadleaves.

Even so, symptoms in grass plants can appear very similar to drought stress under adequate moisture conditions. Timing is very important for tolerance in grass plants to avoid additional damage from Group 4 herbicides. Early or late applications with some products can result in malformed heads and aborted kernels within heads, in addition to the artificial drought symptoms. Awns and rachis can show kinking and seed heads may be more likely to get caught when emerging from the boot.

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Herbicide Injury Symptoms – What to look for
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Groups 5, 6, 7 and 22
Each of these herbicide Groups affect similar (electron transport) pathways in the plant and result in similar symptoms. Groups 5 and 7 have soil activity, as well as foliar activity. Rogue electrons combine with other molecules to create compounds that destroy plant membranes, resulting in the desiccation of tissues. Sometimes they cause bleaching or yellowing symptoms, but not desiccation. In the soil active products, sub-lethal doses can be transported upward in the plants and accumulate at the extremities of the plant tissues (eg. leaf margins or tips) and cause damage. This can happen to a similar degree in foliar applications. Often with soil active products, selectivity is a function of physical separation between the treated layer and the roots of the crop plant. Shallow seeding increases the risk of damage in these cases.

Group 8
Group 8 herbicides affect elongation of cells in plant shoots, that appear stunted and deep green. Once the plant recovers, the affected tissues remain this deep colour and new tissues are a more normal bright green.

Group 10
Group 10 (glufosinate – Liberty) herbicides work in a very similar fashion to Groups 6 and 22, with the following exceptions. Group 10 herbicides act somewhat slower than the previous groups and colouration changes include bleaching turning tissues paler green or white before desiccating.

Group 11
Group 11 (Amitrole) herbicides are slightly soil residual and have long-term residual activity in plants. Amitrole is non-selective, so no tolerance exists in crops and damage is likely to be from the short soil carryover or drift. Group 11 herbicides are pigment inhibitors. The most conspicuous symptom is the production of bright white tissues by the plant. The plant may still have red or purple colouration due to the production of anthocyanins.

Group 14
Group 14 herbicide may be soil active (Authority) or foliar active (Aim/Cleanstart) or both (Heat). These herbicides result in membrane disruption and desiccation, but also result in subtle deformities. Authority has also been reported to cause root and stem girdling desiccation symptoms following heavy rains that release the herbicide from the soil.

Group 27
Group 27 (pyrasulfotole) herbicides are relatively new to Saskatchewan and are sold as one of the components of Infinity. They have both soil and foliar activity and are only upwardly mobile in the plant, resulting in the accumulation of the herbicide in the periphery of the leaves.

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Herbicide Injury Symptoms – What to look for
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Bleaching symptoms and development of bright white tissue occur in areas of accumulation. Unexpected damage typically occurs under cooler than normal conditions where the crop has difficulty metabolizing the compound.

Frequently, crop plants are exposed to herbicides from several different groups at once and may exhibit symptoms of multiple herbicides simultaneously.

The Saskatchewan Agriculture Crop Protection Laboratory (CPL) provides herbicide injury diagnostic services. Because herbicide damage may result in damage claims or end up in court, it is important to ensure that symptoms are documented by a Professional Agrologist who does forensic agrology. Samples submission to the CPL should be done as soon as possible as symptoms may become less visible as the crop progresses. Submission forms for the Crop Protection Lab can be found on the Saskatchewan Agriculture website or contact the CPL at 787-8130. Filling out the form completely with crop and pesticide histories is critical for accurate diagnosis. ✿

Insect Update

By Scott Hartley, PAg, Provincial Specialist, Insect and Vertebrate Pest

Wheat Midge

Although some parts of southeastern Saskatchewan may have had some wheat midge emerge in late June 2010, accumulated heat (degree days) did not reach sufficient levels for significant emergence of the adult flies in most areas until July. Unlike the past two years, emergence will not be affected by insufficient precipitation in April and May and, therefore, degree days should provide a reasonable timeline for midge development. Actual emergence will vary. Therefore, individual field monitoring is essential to determine insect presence and, if necessary, to effectively manage wheat midge infestations. For regional estimates of degree day development, refer to the emergence maps posted at: (http://weatherfarm.weatherbug.com/farm/login.aspx).

Monitoring considerations for wheat midge:

- Due to wide variation in seeding dates in Saskatchewan in 2010, some wheat crops could avoid wheat midge infestations if they are not in a stage that is susceptible to wheat midge damage. The most critical period for monitoring is from the time the boot splits and the head becomes visible, until anthesis (flowering). During this period, the midge can lay eggs directly on the exposed glumes. By the time the yellow anthers are extruded from the wheat head the developing kernel has developed resistance to larval feeding. Note that resistance between tillers and within the head will vary due to variation in seed development.

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Insect Update
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- The adult female midge lays eggs on the wheat head, usually in the evening when temperatures exceed 10 C and wind speed is less than 10 kph. Under windy conditions, the midge will tend to stay below the crop canopy. Egg-laying may occur on lower tillers.

- The most important yield components of the wheat plant are the primary stem and first two tillers. Therefore, they are the most important to protect. After about four days, the eggs hatch and the larvae crawl between the glumes to feed on the developing wheat kernels where they are generally unaffected by an insecticide.

Diamondback Moth
The pheromone traps continue to collect diamondback moth adults. The area with the highest numbers continues to be in the southern region (accumulation of approximately 300 adult moths in the Avonlea area) with low numbers recorded in the central region (ranging from five to greater than 80 accumulated moths in the Saskatoon area). Since the main purpose of the sentinel traps is to note presence in an area, traps will be shut down in July.

Once a population has become established in an area, the first and second generations may be present. The insect could be in any of the life stages (egg, larva, pupae, adult) by this time and field monitoring is more important to determine if the damaging larval stage is feeding on the crop. Sampling in several areas of a field will provide a better estimate of overall infestations. Keep in mind that heavy precipitation can knock diamondback moth larvae off plants resulting in drowning which will help to reduce populations. The *Guide to Crop Protection 2010* provides information on scouting and economic thresholds for diamondback moth and other insect pests in canola.

Bertha Armyworm
As with other insect pests, bertha armyworm development was slowed due to cooler temperatures this spring. Although not expected to be a major pest in 2010, there are a few traps indicating low, potential risk (greater than 300 moths per trap in RM 284, 301, 331, 371 and 402). Data from the traps is being compiled in preparation for mapping and will be posted on the Saskatchewan Ministry of Agriculture website.

Grasshoppers
Wet cool conditions have not been favourable to growth of grasshopper populations so far this year. However, young grasshoppers have been noted in several areas, primarily in southern and central regions. Lush vegetative growth can tolerate substantial feeding from young grasshoppers. The third to fifth immature stages are responsible for most of the destruction to crops. Once a crop begins to form heads, pods, bolls or other reproductive parts, monitoring for grasshoppers becomes more important as feeding increases and damage is more directly related to yield. ✿

Saskatchewan Ministry of Agriculture

NOTICE

PROGRAMS AND SERVICES

Attention producers!

Don't forget to remove all bait stations used for control of gophers

By late spring, all bait stations should be removed. At this time of year, Richardson's Ground Squirrels (gophers) find more attractive green growth for food, making rodenticides less effective. In addition, gophers are less active above ground as they begin to enter a hibernation phase in their life cycle.

Bait stations in the field for an extended period of time increases the potential for accidental exposure to non-target animals – both wild and domestic – including deer, antelope, birds, livestock and even pets.

It's also important to keep in mind that the misuse of toxic baits could jeopardize the availability of rodenticides in the future.

For more information, contact:

- Scott Hartley, Provincial Insect and Vertebrate Pest Specialist, Saskatchewan Ministry of Agriculture at (306) 787-4669; or
- Sean Miller, Integrated Pest Management Agrologist, Saskatchewan Ministry of Agricuture at (306) 787-4670.

Saskatchewan Sunflower Committee Tour & Meeting

Tuesday, July 27, 2010
Agriculture and Agri-Food Research Farm, Indian Head

11:00 a.m.	**Saskatchewan Sunflower Committee Meeting**
12:00 p.m.	**Lunch**
1:00 p.m.	**Plot Tour including:**

- **Earliest Sunflower Hybrids for Saskatchewan**
- **Hybrid Sunflower Response to Nitrogen**
- **Sunflower Hybrid Screening Trial for Early Hybrids not Tested in Canada before this Year**
- **Test Crosses of Early Maturity Sunflowers from Brent Hulke's North Dakota Breeding Program (USDA)**

For more information or to confirm attendance (by July 23 for meal planning) contact:

Elaine Moats, Saskatchewan Agriculture 306-848-2856
Bill May, Agriculture and Agri-Food Canada 306-695-5225

Agriculture and Agri-Food Canada / Agriculture et Agroalimentaire Canada

Saskatchewan Ministry of Agriculture

Growing Forward

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Crops Branch, Saskatchewan Ministry of Agriculture.
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